REMARKS

INTRODUCTION:

In accordance with the foregoing, claims 16, 17 and 23 have been amended, and claims 24-25 have been added. No new matter is being presented, and approval and entry are respectfully requested.

Claims 16, 17, 23, 24 and 25 are pending and under consideration. Reconsideration is respectfully requested.

OBJECTION TO THE TITLE:

In the Office Action, at page 2, the title was objected to as not being descriptive. In view of the proposed amended title set forth above, the outstanding objection to the title should be resolved.

CHANGES TO THE ABSTRACT:

The abstract has been reviewed in response to this Office Action. A new abstract corresponding to claims 16, 17 and 23 is submitted to resolve the Examiner's objections raised in the Office Action. No new matter has been added.

REJECTION UNDER 35 U.S.C. §101:

In the Office Action, at pages 3-4, claims 16, 17 and 23 were rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. This rejection is traversed and reconsideration is requested.

Independent claims 16 and 23 have been amended to show more clearly that the present invention is directed to a method and apparatus that determines spatially similar portions of substances by analyzing three-dimensional structures of the substances including a first structure expressed by three-dimensional coordinates of elements belonging to a first point set and a second structure expressed by three-dimensional coordinates of elements belonging to a second point set and automatically determining a distance between the elements of the first point set and the elements of the second point set that have an optimal correspondence, comprising: dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second

subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence.

Claim 17 has been amended for clarity.

Thus, amended claims 16, 17 and 23 disclose a method/apparatus/process that employs analysis of substances to determine whether the substances have spatially similar portions, and are submitted to disclose patentable statutory subject matter under 35 U.S.C. §101.

REJECTION UNDER 35 U.S.C. §102:

In the Office Action, at pages 4-5, claims 16, 17 and 23 were rejected under 35 U.S.C. §102(b) as being anticipated by USPN 4,853,871 or Holak et al (J. Mol. Biol., 210, 635-648; hereafter, Holak) or Flaherty et al. (Proc. Natl. Acad. Sci. USA, 88, 5041-5045; hereafter Flaherty) or Mosimann et al. (Proteins: Structure, Function and Genetics, 14, 392-400, 1992; hereafter, Mosimann). This rejection is traversed and reconsideration is requested.

Claims 16, 17 and 23 have been amended for clarity.

It is respectfully submitted that USPN 4,853,871 discloses an <u>operator-assisted</u> method for evaluating a protein's structure to determine whether said protein contains at least two target amino acid residues. USPN 4,853,871 does not disclose using a first point set and a second point set that are each subdivided into two subsets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence.

In contrast, amended independent claims 16 and 23, respectively, of the present claimed invention disclose a method and apparatus that is <u>not operator-assisted</u>. In addition, the method, and the apparatus correspondingly, disclose determining spatially similar portions of substances by analyzing three-dimensional structures of the substances including a first structure expressed by three-dimensional coordinates of elements belonging to a first point set and a second structure expressed by three-dimensional coordinates of elements belonging to a second point set and automatically determining a distance between the elements of the first point set and the elements of the second point set that have an optimal correspondence,

comprising: dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence.

Thus, it is respectfully submitted that amended independent claims 16 and 23 are not anticipated under 35 U.S.C. §102(b) by USPN 4,853,871. Since amended claim 17 depends from amended claim 16, amended claim 17 is submitted not to be anticipated under 35 U.S.C. §102(b) by USPN 4,853,871 for at least the reasons that amended claim 16 is submitted not to be anticipated under 35 U.S.C. §102(b) by USPN 4,853,871.

It is respectfully submitted that Holak discloses a method of determining a three-dimensional structure of a trypsin inhibitor from seeds of the squash *Cucurbita maxima* based on 324 interproton distance constraints, supplemented by 27 Φ backbone angle constraints derived from nuclear magnetic resonance measurements. Nuclear Overhauser Effect (NOE) experiments in nuclear magnetic resonance (NMR) suggest only ranges of distances. Holak discloses a novel method of "floating" chirality assignment (see page 636, col. 1, Holak) that is used in the simulated annealing state of the structure calculations to obtain stereospecific assignments at prochiral centers, wherein the procedure allows methylene protons and methyl groups of valine and leucine residues to flip at the prochiral centers so as to fit the NOE data. A diagonal plot of non-sequential NOEs was used as an input in calculations (FIG. 3 of Holak).

In contrast to Holak, amended claims 16 and 23 of the present invention disclose dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence. This, the invention of amended claims 16 and 23 is submitted to be different from the invention

of Holak.

Hence, amended claims 16 and 23 of the present invention are not anticipated under 35 U.S.C. §102(b) by Holak. Since amended claim 17 depends from amended claim 16, amended claim 17 is submitted not to be anticipated under 35 U.S.C. §102(b) by Holak for at least the reasons that amended claim 16 is submitted not to be anticipated under 35 U.S.C. §102(b) by Holak.

It is respectfully submitted that Flaherty discloses an <u>operator-assisted</u> method of determining similarity of three-dimensional structures of actrin and an ATPase fragment of a 70-kDa heat shock cognate protein wherein initially, structures are superimposed manually and equivalent α-carbon (C_α) atoms in the β-sheets of both structures are identified, a transformation is computed to rotate and translate the structures to minimize distances between the C_α atom positions of both residues, the superimposed images are examined <u>by eye</u> to guide classifications of the C_α positions into equivalent positions, such as α-helices and β strands, computing different optimal superposition between the two molecules and terminating when all equivalent residues are identified. <u>Due to accuracy of the visual inspection, an empirical identification of equivalent residues was used in preference to computational methods that rely primarily on distance criteria</u> (see p. 5041, col. 2, Flaherty).

In contrast, amended independent claims 16 and 23 of the present invention disclose a computational method as described above, wherein the computational method is <u>not operator-assisted</u>.

Hence, amended claims 16 and 23 of the present invention are not anticipated under 35 U.S.C. §102(b) by Flaherty. Since amended claim 17 depends from amended claim 16, amended claim 17 is submitted not to be anticipated under 35 U.S.C. §102(b) by Flaherty for at least the reasons that amended claim 16 is submitted not to be anticipated under 35 U.S.C. §102(b) by Flaherty.

It is respectfully submitted that Mosimann discloses an <u>operator-assisted</u> procedure. Mosimann discloses that automated sequence alignments were <u>revised based upon the inspection</u> of the RNase A structure before the amino acids of the P-30 protein were assigned the coordinates of the RNase A template (see p. 393, col. 1, Mosimann). In contrast, amended independent claims 16 and 23 of the present invention disclose a computational method as described above, wherein the computational method is <u>not operator-assisted</u>.

Hence, amended claims 16 and 23 of the present invention are not anticipated under 35 U.S.C. §102(b) by Mosimann. Since amended claim 17 depends from amended claim 16,

amended claim 17 is submitted not to be anticipated under 35 U.S.C. §102(b) by Mosimann for at least the reasons that amended claim 16 is submitted not to be anticipated under 35 U.S.C. §102(b) by Mosimann.

DOUBLE PATENTING:

In the Office Action, at pages 5-6, claims 16, 17 and 23 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 14 of USPN 6,453,064.

It is respectfully submitted that the present invention is directed to a method and apparatus to determine spatially similar portions of substances by analyzing three-dimensional structures of the substances including a first structure expressed by three-dimensional coordinates of elements belonging to a first point set and a second structure expressed by three-dimensional coordinates of elements belonging to a second point set and automatically determining a distance between the elements of the first point set and the elements of the second point set that have an optimal correspondence, comprising: dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence.

In contrast, claims 1 and 14 of USPN 6,453,064 discuss an extraction apparatus that rotates two point sets to obtain partial matching between the two point sets, superimposing the two rotated point sets on each other, determining a common portion length, of a common portion, accumulating distances between the points paired with each other to form the common portion, and extracting from the common portion a common portion that represents a common structure while minimizing the cumulative distance information calculated.

Thus, the present invention utilizes different operations from the invention of USPN 6,453,064. For example, the present invention utilizes dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition

between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence, while, in contrast, the invention of claims 1 and 14 of USPN 6,453,064 utilizes rotation and superposition of two point sets.

Hence, it is respectfully submitted that the present claimed invention, as recited in independent claims 16 and 23 is different from the invention of claims 1 and 14 of USPN 6,453,064. Thus, amended claims 16 and 23 of the present invention are submitted to be allowable over claims 1 and 14 of USPN 6,453,064 and not subject to rejection under the judicially created doctrine of obviousness-type double patenting. Since amended claim 17 of the present invention depends from amended claim 16 of the present invention, amended claim 17 is submitted to be allowable over claims 1 and 14 of USPN 6,453,064 and not subject to rejection under the judicially created doctrine of obviousness-type double patenting for at least the reasons that amended claim 16 is submitted to be allowable over claims 1 and 14 of USPN 6,453,064 and not subject to rejection under the judicially created doctrine of obviousness-type double patenting.

NEW CLAIMS:

New claim 24 recites that the features of the present invention include a computer-readable medium containing computer-readable instructions to determine spatially similar portions of substances by analyzing three-dimensional structures of the substances including a first structure expressed by three-dimensional coordinates of elements belonging to a first point set and a second structure expressed by three-dimensional coordinates of elements belonging to a second point set and automatically determining a distance between the elements of the first point set and the elements of the second point set that have an optimal correspondence, the computer-readable instructions comprising: dividing the first point set and second point set into first subsets and second subsets, respectively, according to a secondary structure exhibited by the three-dimensional coordinates of the elements of the first and the second point sets; generating a combination of correspondence satisfying a first restriction condition between the first subsets and the second subsets from among candidates for the combination of correspondence; determining the optimum correspondence between the elements belonging to each pair of subsets corresponding in the combination of correspondence generated; and calculating a root mean square distance between all of the elements corresponding in the optimum correspondence.

New claim 24 is supported by paragraphs [0260], [0272] and [0285] in the published application.

Nothing in the prior art teaches or suggests new claim 24. It is submitted that this new claim distinguishes over the prior art.

New claim 25 depends from, and further limits, new claim 24 and is submitted to be allowable for at least the reasons that new claim 24 is submitted to be allowable.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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